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Some aspects on human preference in communication and friendship

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2008 APS March Meeting

New Orleans, Louisiana

U39.00010

Morial Convention Center – 231

March 13, 2008; 10:12 AM–10:24 AM

Motivation

Questions

Sociology provides a variety of theories

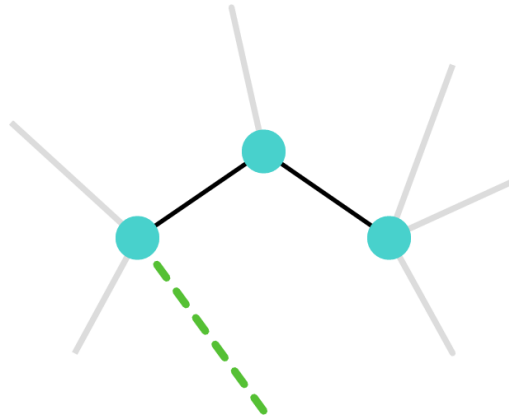
- actor, dyadic, triadic, or global level
- endogenous / exogenous
- 'Structural Hole Theory', 'Balance Theory', 'Collective Action Theory', ...

few conclusive direct quantification

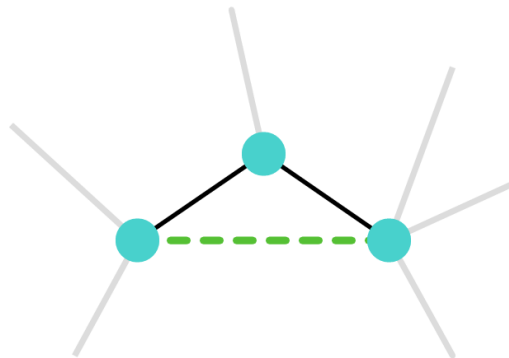
New data

- on-line communities have gained immense popularity
- member activity enables to study structural preferences of social behavior

Quantities: shortest path

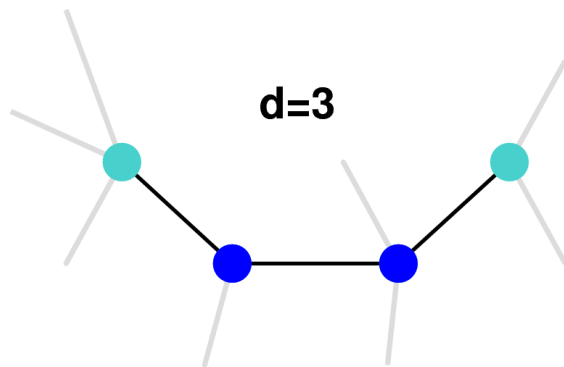
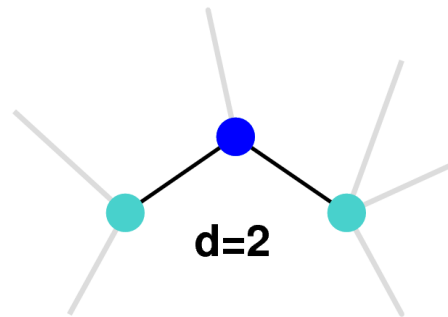
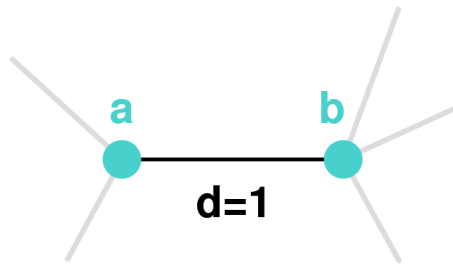


Structural Hole
Theory



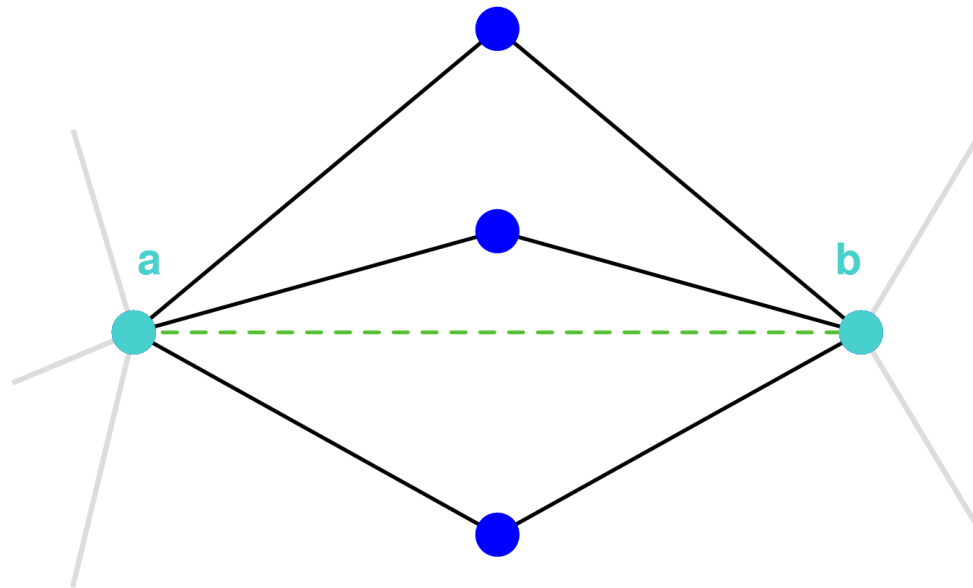
Balance Theory

Quantities: shortest path



in general
as function
of distance

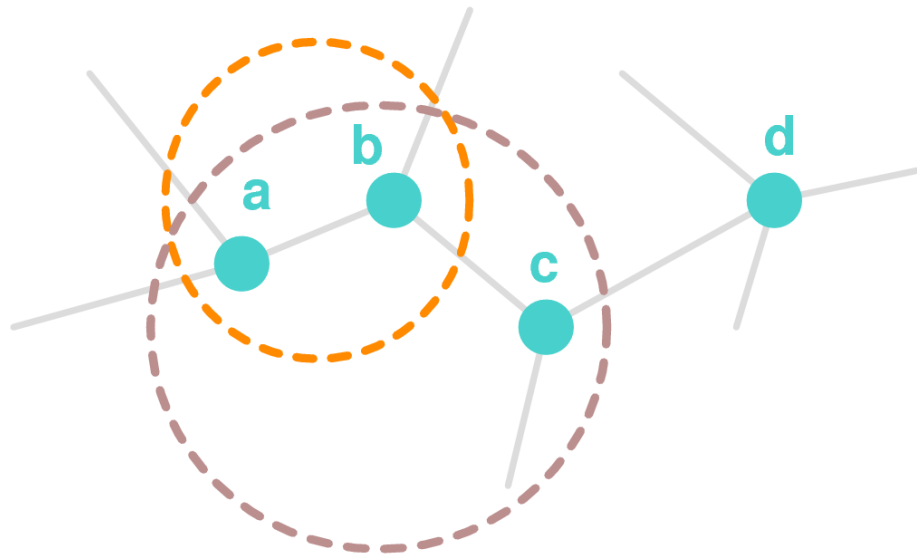
Quantities: common acquaintances



3 common friends
between
a and b

Collective
Action
Theory

Quantities: common interests



Exogenous
Attribute

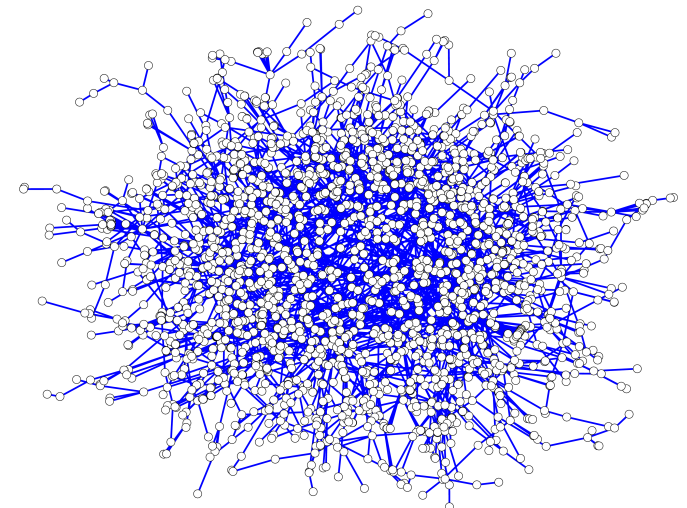
a and b have 2 common interests

a and c have 1 common interests

a and d have no common interests

Data

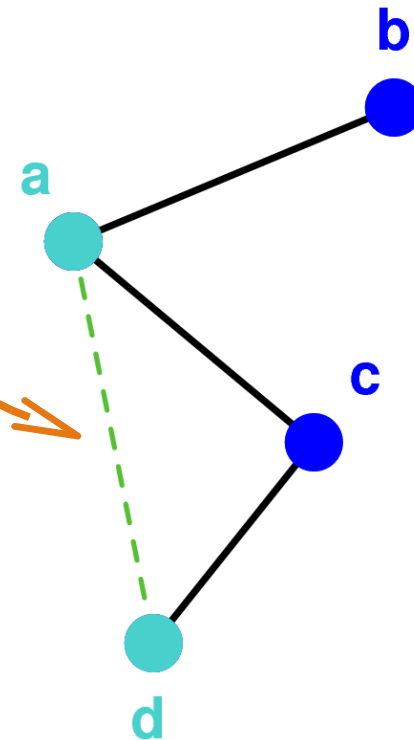
- on-line community (sexual related)
- different kind of activity during 63 days
- in particular: 12.5 million messages
- links undirected, not necessarily mutual
- final:
 - 80683 nodes,
 - 1370730 edges,
 - $\langle k \rangle = 34$
- information on clubs (groups)



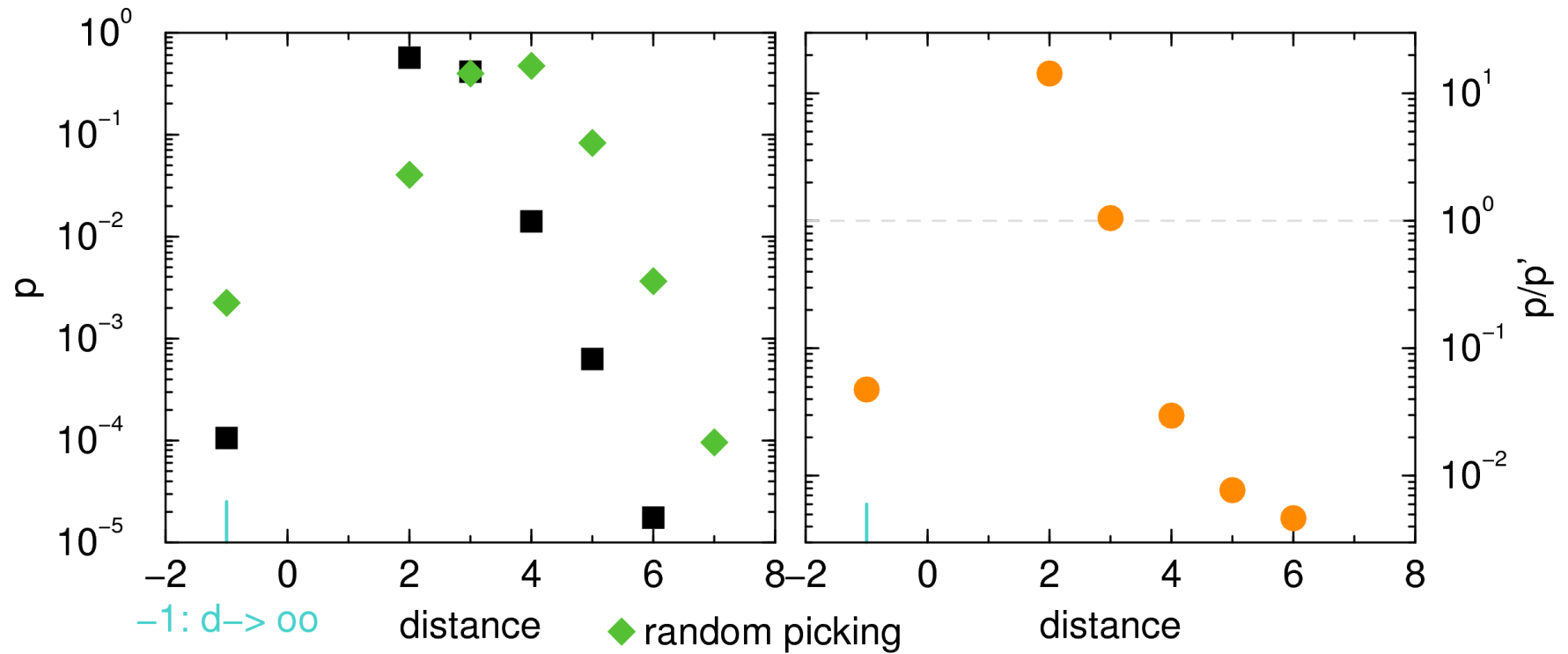
Analysis

time	sender	receiver
2873	a	b
2875	a	c
2882	d	c
...		
2921	a	d
...		

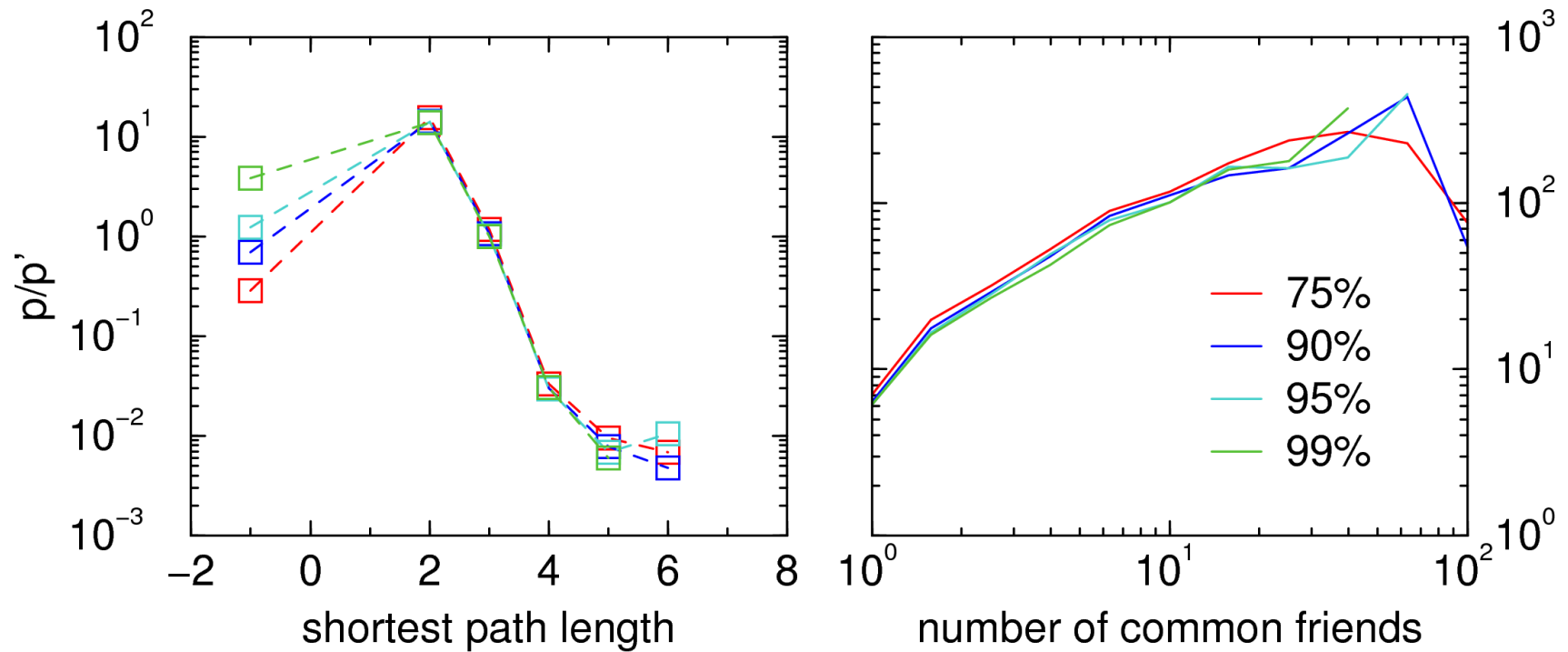
properties?
distance,
common acq.,
...



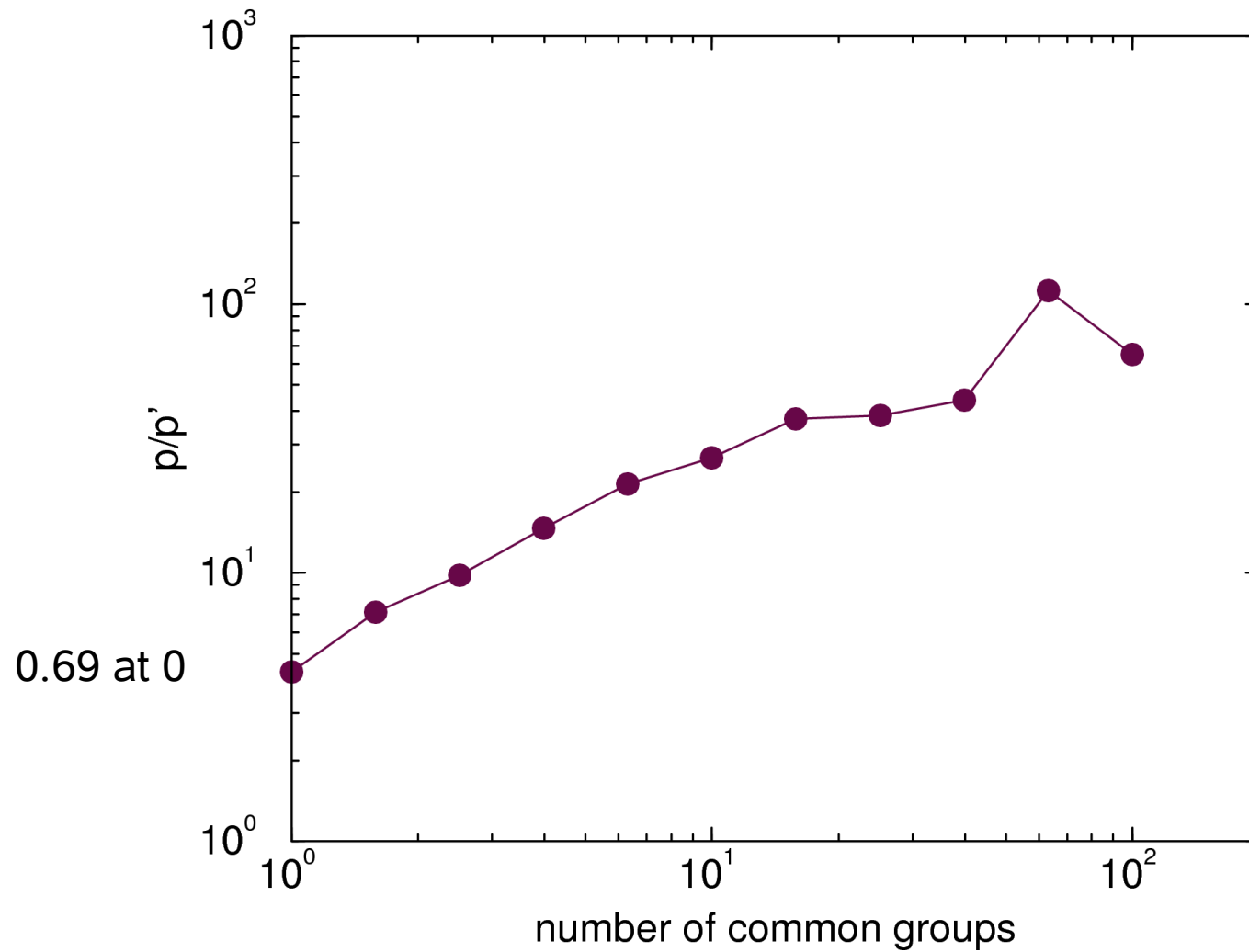
Results: shortest path



Results: common acquaintances



Results: common attributes



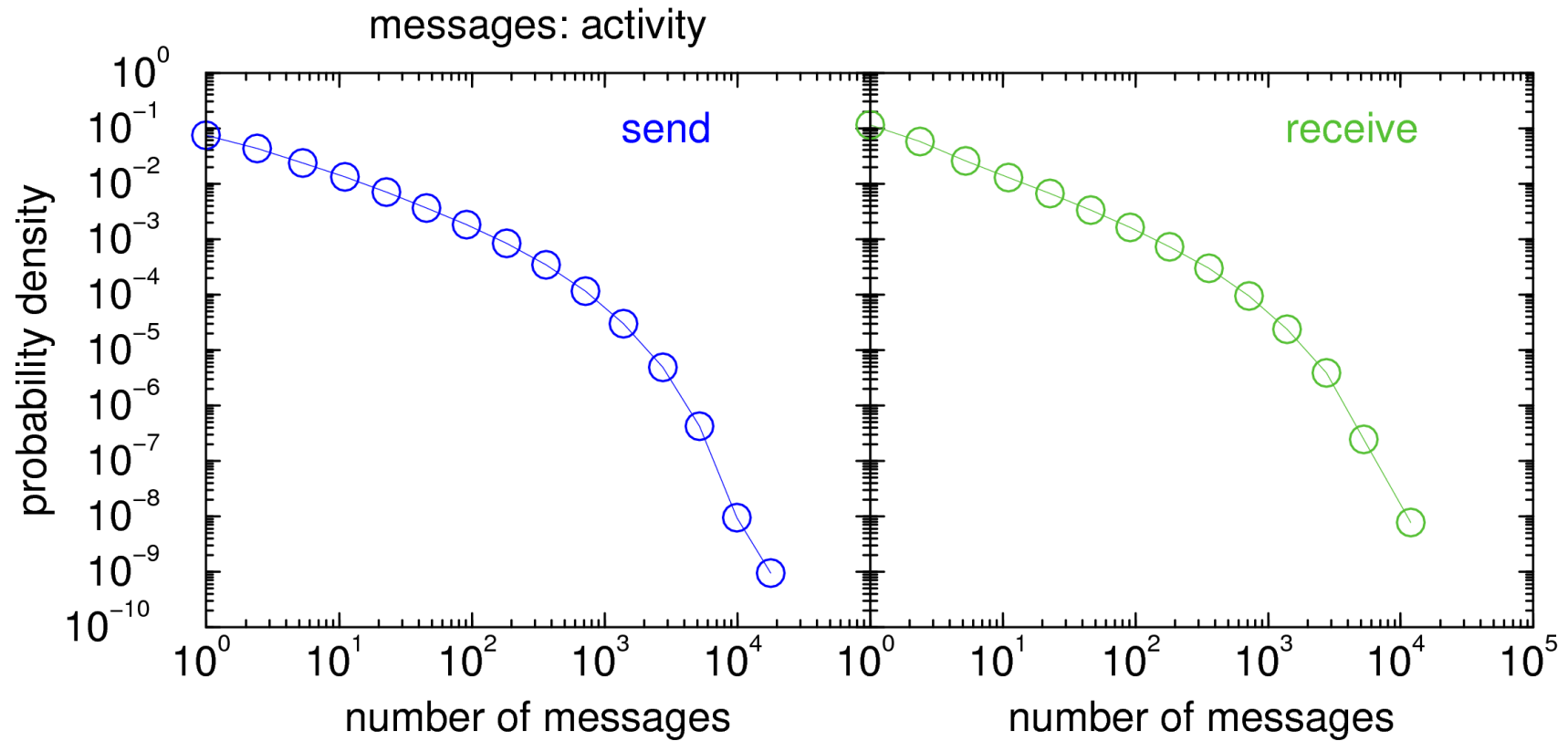
Summary

- + new communication mainly at **short distances** (friends of friends)
- + **many common friends** facilitate new relation
- + in favor of **same attributes**
- + in agreement with *G. Kossinets et al., Science 2006*

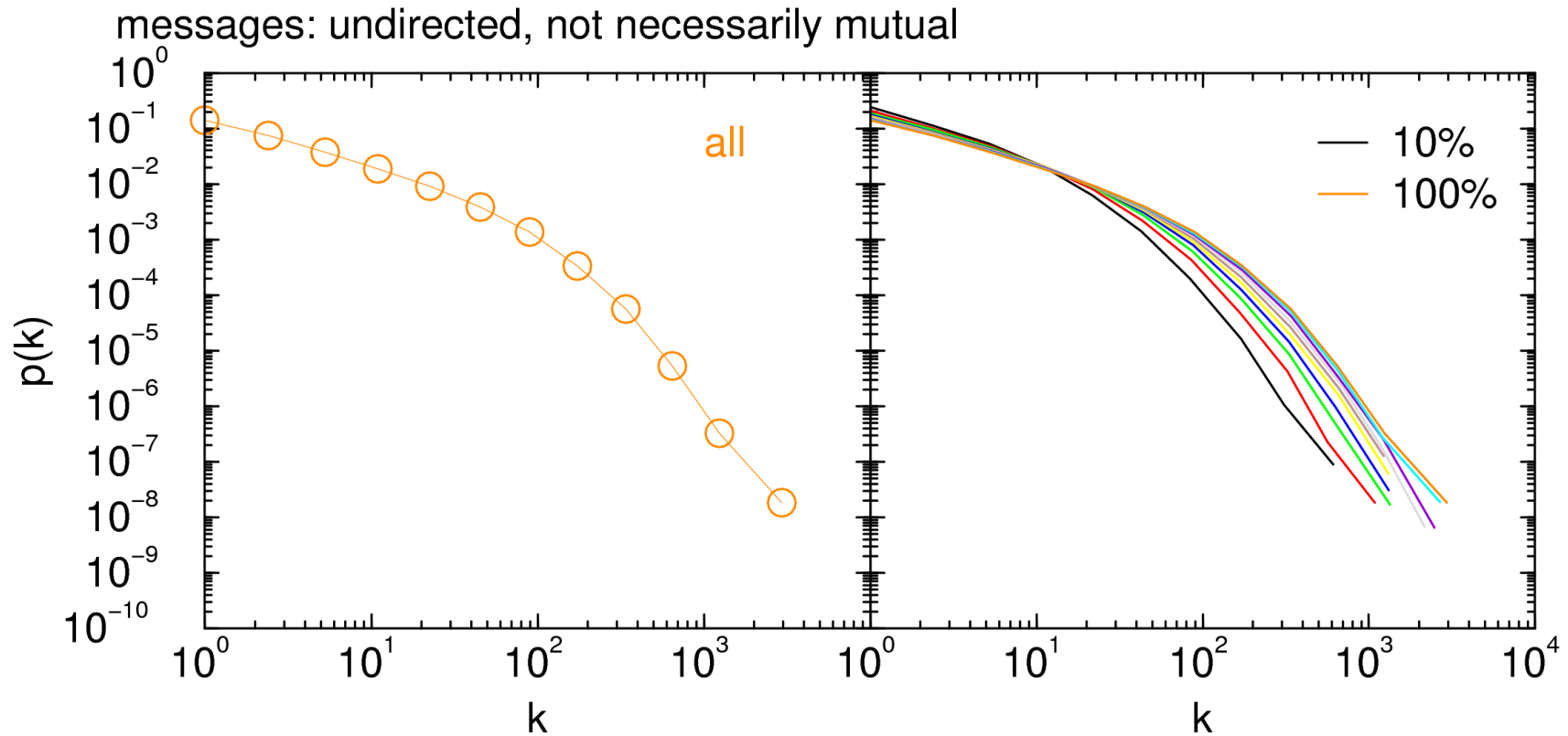
Outlook

- > extension to **other quantities**
- > focus on **new members**

Basic Analysis: activity



Basic Analysis: degree distribution



Analysis

12,590,896 messages (time, sender, recipient)

sequential

1. assemble network using first 90%
2. read snd -> rcv
3. calculate distance
4. connect snd and rcv
5. goto 2.

random

1. assemble network using first 90%
2. read snd -> rcv
3. distance between random nodes
4. connect snd and rcv
5. goto 2.

consider only distances $d > 1$

step 3 also other quantities

example:

	90%	100%		
nodes:	78 265	80 683	added:	2 418
links:	1 254 785	1 370 730	added:	115 945